**PART 1**

1. In a Bohr-Rutherford model of the atom:
   1. Where are the protons found? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. Where are the neutrons found? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   3. Where are the electrons found? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   4. Which particles make up most of the mass of the atom? \_\_\_\_\_\_\_\_\_\_\_\_\_\_
   5. Which particles take up most of the space in the atom? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Name the scientist who made each of the following chemistry discoveries.
3. Discovered electrons \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. Discovered that electrons are in orbitals with different energy levels \_\_\_\_\_\_\_\_\_\_\_\_\_
5. Stated that matter was made of solid spherical atoms \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
6. Discovered neutrons \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
7. His gold foil experiment showed nucleus and empty space \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
8. State the rules to find the number to find the numbers of protons, electrons and neutrons in an atom.

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1. Explain the difference between a period and a group on the periodic table..

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1. Complete the following table.

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Position in the Periodic Table** | **Ability to React With Other Elements** | **Number of Electrons in the Outermost Orbital** |
| Alkali Metals |  |  |  |
| Halogens |  |  |  |
| Noble Gases |  |  |  |

1. Fill in the blanks with the missing numbers.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Element** | **Symbol** | **Atomic Number** | **Mass Number** | **# of Protons** | **# of Electrons** | **# of Neutrons** | **Standard Atomic Notation** |
|  | Be | 4 | 9 |  |  |  |  |
|  | C | 6 |  |  |  | 8 |  |
| Silicon |  |  |  |  | 14 | 14 |  |
| Potassium |  |  |  | 19 |  | 20 |  |

1. Describe how each of the following atoms gains or loses electrons to form an ion and have a stable number of electrons in its outer shell.
   1. Beryllium, atomic number 4 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. Nitrogen, atomic number 7 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   3. Sulfur, atomic number 16 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Write the charge for each of the ions in the previous question.
   1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. Draw Bohr-Rutherford diagrams for each of the following atoms.

(a) Potassium (b) Chlorine

1. Draw Bohr-Rutherford diagrams for each of the following **ions.**

a.) sodium ion b) oxygen ion

1. Match the description on the left with one term on the right. Use each term only once.

|  |  |  |  |
| --- | --- | --- | --- |
| Letter | Term | **Match Letter** | Phrase |
| A | atomic number |  | charged atom |
| B | mass number |  | number of protons |
| C | proton |  | positive subatomic particle |
| D | neutron |  | cation |
| E | atom |  | anion |
| F | ion |  | sum of protons and neutrons |
| G | positive ion |  | uncharged subatomic particle |
| H | negative ion |  | smallest unique particle of mattter |

1. Identify the numbers of protons and neutrons in each of the atoms listed below by interpreting their standard atomic notation.

|  |  |  |  |
| --- | --- | --- | --- |
| **Standard Atomic Notation** | **# of Protons** | **# of Neutrons** | **# of Electrons** |
| 35  Cl  17 |  |  |  |
| 23  Na  13 |  |  |  |
|  |  |  |  |

1. A) What is the difference between a coefficient and a subscript when writing a chemical formula?  
     
     
      
   b) Identify the elements in the following compounds and state the relative numbers of atoms of the elements.

|  |  |  |
| --- | --- | --- |
| Formula of Compound | Name each Element  in the Compound | Number of Atoms of each element |
| 2 NaHCO3 |  |  |
| CH3COO(CH2)7CH3 |  |  |
| 3 Fe2O3 |  |  |

1. Write the formula, name and hook diagram for the compound formed by each of the following combinations of elements.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Elements** | **Combining**  **Capacity for each element** | **Formula** | **Name** | **Hook Diagram** |
| Potassium and chlorine |  |  |  |  |
| Calcium and oxygen |  |  |  |  |
| Aluminum and sulfur |  |  |  |  |

1. What is an ion? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. What kinds of ions, including number and charge, are formed by

(a) Alkali metals \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

(b) Halogens \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Complete and memorize the following chart.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Group #** | **1** | **2** | **13** | **14** | **15** | **16** | **17** | **18** |
| **# of bonds formed?** |  |  |  |  |  |  |  |  |
| **Gain or Loss of Electrons?** |  |  |  |  |  |  |  |  |
| **How Many Electrons?** |  |  |  |  |  |  |  |  |
| **Ionic Charge?** |  |  |  |  |  |  |  |  |

1. Match each test with the appropriate gas in column B.

|  |  |  |
| --- | --- | --- |
| Gas | What type of splint? | Result? |
| hydrogen |  |  |
| oxygen |  |  |
| carbon dioxide |  |  |



19.Indicate whether each of the statements is true or false. If you think the statement is false, rewrite it to make it true.

1. A Bohr diagram shows electrons in orbits around the nucleus.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. A neutron is positive and located in the nucleus.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Elements in the same period have similar properties.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Noble gases are very unreactive liquids.

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1. Alkali metals include sodium, potassium and chlorine.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Halogens include fluorine, bromine and argon.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Metalloids are compounds that have both metallic and nonmetallic properties.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. The atomic number decreases from left to right across a row of the periodic table.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**PART 2**

**Multiple Choice:** circle the best answer to each question.

1. While cleaning out your parents’ garage, you find a container with some liquid still in it. The label has almost disappeared from the container, but you can see a symbol on the container like the one shown. What does this symbol tell you about the contents of the container?

|  |  |
| --- | --- |
| hhps warning corrosive | * 1. They contain the bony hands of skeletons.   2. They are explosive.   3. They are corrosive.   4. They are poisonous.   5. They are incredibly tasty with french fries. |

1. Which of the following statements based on the particle theory of matter is INCORRECT?
   1. Different substances are made of different kinds of particles.
   2. The particles of a solid substance are always moving.
   3. The spaces between particles are large in comparison to the particles themselves.
   4. The attraction between particles in a liquid is weaker than in a gas.
2. You become thirsty while backpacking through Asia and are looking for something to drink when you stumble across a sealed bottle filled with a clear liquid. You cannot speak or read the language on the container’s label, so you cannot tell what the liquid is. Fortunately, the label has a symbol container like the one shown. What can you tell about the liquid?

|  |  |
| --- | --- |
| hhps danger explosive | * 1. It is explosive.   2. It is corrosive.   3. It emits dangerous radiation and particles.   4. It is used for creating works of abstract art.   5. It is flammable. |

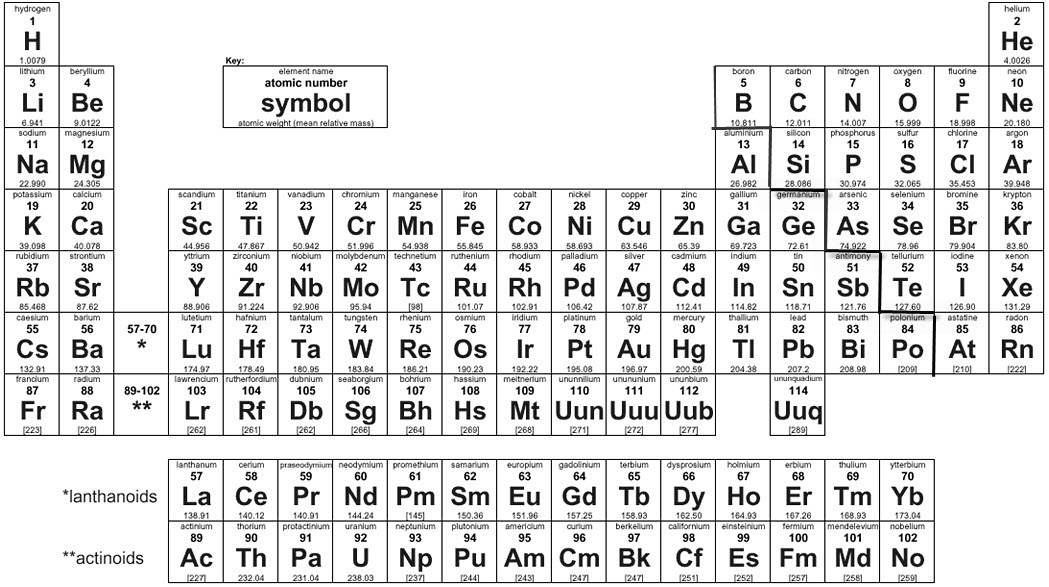
1. Which of the following statements is INCORRECT?
   1. Noble gases have completely filled outer orbitals.
   2. All physical changes, such as a change of state or breaking, are reversible.
   3. Gold is a very malleable and ductile metal.
   4. As gases cool, they occupy smaller volumes.
2. Which of the following statements is INCORRECT?
3. The spaces between particles in a liquid are greater than those in a solid.
4. Liquids have definite, fixed volumes and indefinite shapes
5. Gases have indefinite volumes and indefinite shapes.
6. The attraction between particles increases as the space between particles increases.
7. Ketchup flows more slowly than malt vinegar when poured over French fries. Which of the following statements is CORRECT?
8. Ketchup is superior to salt and malt vinegar for fish and chips.
9. Ketchup is more soluble than malt vinegar.
10. Ketchup is less ductile than malt vinegar.
11. Ketchup has a higher viscosity than malt vinegar.
12. Which of the following is NOT a chemical property?
    1. Reacts with acid c) Combustibility/flammability
    2. Rusts or tarnishes d) Melts from solid to liquid state
13. Which of the following physical properties can NOT be used to describe a solid?
14. Malleability c) Hardness
15. Viscosity d) Ductility

**SHORT ANSWER**

1. On the periodic table below label and colour the following groups:

a) alkali metals b) halogens

c) noble gases d) metalloids



1. Complete the following table with the correct names for the physical changes of state:

|  |  |  |  |
| --- | --- | --- | --- |
| Solid to liquid |  | Liquid to solid |  |
| Liquid to gas | **evaporation** | Gas to liquid |  |
| Solid to gas |  | Gas to solid | **Sublimation** |

3. List the 5 clues of a chemical change.

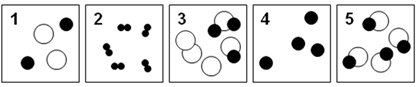
4. For the following statements, indicate whether the statement describes a physical change or a chemical change. **State your reason** – if it is a physical change, indicate what kind of change it is (e.g. change of state). If it is a chemical change, indicate **all** applicable reasons (e.g. colour change and precipitate formed).

|  |  |
| --- | --- |
| **Statement** | **Physical Change or Chemical Change?**  **State the reason.** |
| Frost forms on a window after you breathe on it in the winter. |  |
| Clear liquid sodium hydroxide is added to a clear blue liquid, and a whitish solid is formed. |  |
| Yeast converts sugars into carbon dioxide, causing bread to rise. |  |
| Steel wool scrapes rust off a bike. |  |

5. Name and describe 5 physical properties of milk.

6. Name three chemical properties.

7. Classify each of the diagrams according to the 4 categories of matter.



1 –

2 –

3 –

4 –

5 -